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MONTHLY REPORT - NOVEMBER 1981

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MONTHLY REPORT - NOVEMBER 1981

STATUS OF PUBLICATIONS

Published

Cramer, J.L., R.M. Nakamura, A.E. Dizon, and W.N. Ikehara. 1981. Burnt tuna: Conditions leading to rapid deterioration in the quality of raw tuna. Mar. Fish. Rev. 43(6): 12-16.

Burnt tuna is raw tuna which is paler and softer than normal. This study indicates that the burnt tuna condition results from muscle cell degeneration which begins prior to the death of the fish and proceeds more rapidly after death than in normal tuna. Female sex, longer fighting times, and less efficient chilling are positively correlated with the occurrence and severity of the burnt tuna condition.

Evans, R.H., D.R. McLain, and R.A. Bauer. 1981. Atlantic skipjack tuna: Influences of mean environmental conditions on their vulnerability to surface fishing gear. Mar. Fish. Rev. 43(6): 1-11.

Pertinent data and literature are examined to determine the effects of the environment on the spatial distribution of skipjack tuna, Katsuwonus pelamis, in both the Atlantic and Pacific Oceans. Environment/skipjack distribution relationships derived from this information are applied to long-term annual mean distributions of dissolved oxygen and thermal structure for the Atlantic Ocean between lat. 40°N and 40°S. The depth of skipjack habitat is mapped. Within the defined habitat areas, high vulnerability of skipjack tuna to surface gear is inferred and areally compared with the long-term catch of the FIS (French, Ivory Coast, and Senegalese) fleet to confirm the validity of this approach. This technique is then used to hypothesize areas of vulnerability of

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skipjack to surface gear outside the range of the FIS fleet effort in the western Atlantic. Finally, the effects of surface winds on fishing operations are discussed and those areas where wind speed may hamper operations are outlined for the Atlantic Ocean between lat. 30°N and 30°S.

Lasker, Reuben (editor). 1981. Marine Fish Larvae: Morphology, Ecology, and Relation to Fisheries. Washington Sea Grant Program, University of Washington Press. Seattle, Washington. 131 pp.

The following papers were published in Lasker (1981):

Hunter, John R. Feeding ecology and predation of marine fish larvae, pp. 33-77.

Lasker, Reuben. The role of a stable ocean in larval fish survival and subsequent recruitment, pp. 80-87.

Moser, H.G. Morphological and functional aspects of marine fish larvae, pp. 89-131.

Smith, Paul E. Fisheries on coastal pelagic schooling fish, pp. 1-31.

Matsumoto, Walter M., Thomas K. Kazama, and Donald C. Aasted. 1981. Anchored fish aggregating devices in Hawaiian waters. Mar. Fish. Rev. 43(9): 1-13.

Fish aggregating devices (FAD's) made of 55-gallon oil drums and wooden rafts were moored in Hawaiian waters off the islands of Oahu, Lanai, and Hawaii from May 1977 through July 1979. The FAD's successfully attracted numerous pelagic fishes, including large schools of skipjack and small yellowfin tunas. Commercial tuna pole-and-line boats benefited greatly by taking large catches of tunas from around the FAD's. Fishing around the FAD's resulted in reduced fuel and baitfish expenses. Trolling boats also benefited as they experienced a reduction in the number of zero-catch days. The success of the FAD experiment encouraged the State of Hawaii to implement its own FAD system involving 26 fish aggregating devices around seven major islands.

Administrative Reports

La Jolla Laboratory

Mackett, David. 1981. Southwest Fisheries Center current year operating plans for fiscal year 1982. SWFC Admin. Rep. LJ-81-25.

Mackett, David. 1981. Planning and control of research and development. SWFC Admin. Rep. LJ-81-26.

Walker, William A., and Daniel F. Cowan. 1981. Air sinus parasitism and pathology in free-ranging common dolphins (Delphinus delphis) in the eastern tropical Pacific. SWFC Admin. Rep. LJ-81-23C.

Translation

Inoue, Motoo, Yukinobu Iwasaki, Mitsuyoshi Aoki, Kouhei Tutumi, and Hideo Nagaoka. 1974. Some notes on the artificial fertilization and rearing of larvae in frigate mackerel and yellowfin tuna, cultured with seawater-acclimatized Chlorella as a basic diet. J. Fac. Mar. Sci. Technol. Tokai Univ. (8): 27-36. (Engl. transl. by Tamio Otsu, 1981, 15p., Transl. No. 58; available Southwest Fish. Cent., Natl. Mar. Fish. Serv., NOAA, Honolulu, Hawaii 96812. [Limited distribution]

Approved by Center Director

Gilmartin, William G., and Robert J. Morrow. Captive maintenance of Hawaiian monk seal (Monachus schauinslandi) pups to aid in definition of causes of mortality and potentially enhance survival. (Abstr.) For consideration for publication in the collected papers from the Fourth Biennial Conference on the Biology of Marine Mammals, San Francisco, California, December 14-18, 1981.

Sakagawa, Gary T., and Philip E.K. Symons. The International Skipjack Year Program of the ICCAT. For consideration for publication in Fisheries.

Samples, Karl C., and James H. Prescott. The use of sail-assisted commercial fishing vessels in the Pacific: An economic appraisal. For consideration for publication in the collected papers from the International Conference on Ocean Resource Development in the Pacific, October 13-15, 1981, Honolulu, Hawaii.

Santander, H., J. Alheit, and P.E. Smith. Probability of sample distribution of eggs of anchovetta, Engraulis ringens, off Peru. For consideration for publication in Boletines, Instituto del Mar del Peru (IMARPE).

Uchida, Richard N., and Daryl T. Tagami. Status of groundfish research in the Northwestern Hawaiian Islands. (Abstr.) For consideration for publication in Proceedings, WEstern Groundfish Conference, Gleneden Beach, Oregon, November 18-20, 1981.

[U.S.] National Marine Fisheries Service. Summary of groundfish research/management activities, National Marine Fisheries Service, Southwest Fisheries Center, Honolulu Laboratory. For consideration for publication in Proceedings, Western Groundfish Conference, Gleneden Beach, Oregon, November 18-20, 1981.

HONOLULU LABORATORY

INSULAR RESOURCES INVESTIGATION

Report Completed for Western Groundfish Conference

Richard N. Uchida, Leader of the Insular Ecosystem Study Task, and Research Assistant Darryl T. Tagami completed a report, "Status of groundfish research in the Northwestern Hawaiian Islands," which was presented by Uchida at the Western Groundfish Conference held at Gleneden Beach, Oregon, November 18-20, 1981. Analysis based on catch data collected on the NOAA research vessel, Townsend Cromwell, during research survey cruises to the Northwestern Hawaiian Islands (NWHI) and from Japanese trawlers fishing the central North Pacific seamounts between 1972 and 1976, showed that prior to the implementation of the Magnuson Fishery Conservation Management Act in 1977, catch rates of armorhead, Pentaceros richardsoni, and alfonsin, Beryx splendens, at Hancock Seamounts dropped steadily from 83 metric tons (MT)/h in 1972 to 11 MT/h in 1976. In 1978-81, however, catch rates from Honolulu Laboratory research cruises and from authorized Japanese trawlers fishing within the U.S. Fishery Conservation Zone have shown an upward trend.

Other groundfish data from handline and trap fishing conducted at Hancock, Ladd, Nero, and other unnamed seamounts near Midway Islands indicated a rather distinct difference in species composition between Hancock and the other seamounts. According to Uchida and Tagami, the catches at Hancock were dominated by members of the armorhead-alfonsin complex, whereas those seamounts to the south had catches that were composed mainly of fishes belonging to the tropical snapper-grouper comlex.

Work Continues on Northwestern Hawaiian Islands Fishery Atlas

This month Fishery Biologist James H. Uchiyama, assisted by Research Assistants Darryl Tagami and Michael P. Seki, worked on the resource atlas of the Northwestern Hawaiian Islands (NWHI). Uchiyama and Seki matched the 5-digit species code used on catch forms with the 10-digit Coastal Zone Management code to arrange the fishes caught in the NWHI in the phylogenetic scheme according to Greenwood et al. (Greenwood, P.H., D.E. Rosen, S.H. Weitzman, and G.S. Myers. 1966. Phyletic studies of teleostean fishes, with a provisional classification of living forms. Bulletin of the American Museum of Natural History, vol. 131, article 4.) and Nelson (Nelson, Joseph S. 1976. Fishes of the world. John Wiley and Sons, New York.), and they made nomenclatural corrections for recent systematic changes where families have been split or combined. Tagami processed trap, pot, and net catch data to prepare a listing of the species caught only in the NWHI. Tagami is also processing other catch data for a list of species caught by other types of gear. The list of species caught will be compared against the species list in the code series to eliminate species not caught in the NWHI.

Biological Studies on Northwestern Hawaiian Islands Fish Species Continue

Research Assistant Alan R. Everson continued his studies on the maturation and fecundity of the red snapper, Etelis carbunculus, and the pink snapper, Pristipomoides sieboldii. Everson processed 250 of the 275 ovaries collected from red snappers. Much of the data on egg counts, length, weight, date of capture, and location and stage of maturity of egg samples have been stored on magnetic tape, and analysis of the data will commence as soon as the remaining red snapper ovaries are processed.

Research Assistant Michael Seki continued his study on the food habits of pig ulua, Caranx cheilio. Although major prey items of pig ulua included fishes in the Families Serranidae, Priacanthidae, and Bothidae, large numbers of various invertebrates were also present in the stomach contents. Among these were caridean shrimps; octopods; clam shells, Nemocardium hawaiiensis, of the Family Cardiidae; pen shells, Pinna muricata; and a sea urchin, Prionocidaris hawaiiensis; each comprised 100% of the contents of some of the stomach samples. In addition, various species of small crabs, a brittle star (Ophiuroidea) and a crangon were preyed on.

The clam and pen shells were identified by Beatrice L. Burch of the Bishop Museum. Burch indicated that a good number of N. hawaiiensis were taken alive in a couple of trawl hauls on earlier cruises of the Townsend Cromwell in Hawaiian waters.

Diving Time in Submersible Confirmed

Fishery Biologist Reginald M. Gooding received confirmation from Dr. Deetsie Chave, Hawaii Undersea Research Laboratory, that the Honolulu Laboratory's request for diving time on the submersible, Makalii, for April-May has been approved. Gooding discussed plans for the use of the Makalii with Dr. Stephen Ralston who has been allotted two dives in September. Gooding and Ralston have agreed to collaborate and pool data on certain of the commercial bottom fish observations of mutual interest.

* * * * * * * * * *

Arlene Souza of the Educational Film Branch, State Department of Education (DoE), talked to Fishery Biologist Reginald Gooding regarding the use of 16-mm film footage on the Northwestern Hawaiian Islands in the Honolulu Laboratory's film file. The DoE plans to use the footage for a film it is producing for middle elementary grade students. Souza will formalize the request for the use of the footage in a letter to the Honolulu Laboratory.

Transfer of Honolulu Laboratory Invertebrate Collection Continues

Beatrice L. Burch, Invertebrate Collection Manager of the Bernice P. Bishop Museum, and her staff continued the sorting and cataloging of the Honolulu Laboratory invertebrate collection for transfer to the Bishop Museum. The project is under the supervision of Dr. Dennis Devaney of the Bishop Museum and is funded by a grant from the National Science Foundation. Most of the sorting work is being done in the Honolulu Laboratory warehouse, where the invertebrate collection is currently housed.

Burch and her staff have been splitting and sorting samples collected with the Cobb pelagic trawl on earlier cruises of the R/V Townsend Cromwell. Many of the gallon jars contain about 2,300 to 2,800 cc of plankton in the 3,600 cc volume of the jars, and much effort is required merely to split the samples down to a manageable sortng volume. Sorted and cataloged groups unfamiliar to Burch are being sent for identification to specialists, including Dr. Thomas E. Bowman and Dr. Fenner L. Chase of the Smithsonian Institution.

Included in the material already identified by Dr. Chase are late zoeal stages of an eucaridan Malacostraca, Amphionides reynaudii (H. Milne-Edwards 1832), which will be included in a forthcoming multivolume work, " Biology of Crustacea," now in preparation. Recognized in this work is a new order of eucaridan Malacostraca, the Amphionidacea, in addition to Euphausiacea and Decapoda, as suggested by Williamson (Williamson, D.I. 1973. Amphrionides reynaudii (H. Milne-Edwards), representative of a proposed new order of eucaridan Malacostraca. Crustaceana 25: 35-50). More specimens of this species and a hyperiid Amphipoda, Platyscelus armata (Platyscelidae), which was identified with the help of Dr. Bowman, are being found in the samples.

FISHERY MANAGEMENT RESEARCH PROGRAM

Contract Work Continues on Several Fishery Socio-Economic Studies

Dr. Robert A. Skillman, Fishery Biologist, reports that progress has been made this month on several contracts for the collection of socio-economic information for the Honolulu Laboratory. First, a vessel inventory contract has been completed with the delivery of computer tapes containing data on all registered vessels on the public record in American Samoa, Commonwealth of the Northern Mariana Islands, Guam, and Hawaii. The purpose of this inventory is to provide a data base for conducting various fisheries surveys. The classification of vessels by vessel type and fishery is required when designing statistically efficient surveys. The need for more highly-detailed

classification categories to be used by the island states was recognized during the early stages of the contract work. It was decided therefore that a second phase would have to be implemented. A proposal for the implementation of this phase has been prepared.

Work is also continuing on a survey of the wholesale fish dealers in Hawaii designed to obtain information necessary for evaluating the impact of proposed management measures on this segment of the fishing industry. The contractor has now completed a preliminary survey, the statistical design of the final survey, and the field instrument. The field phase of the contract has now started and will continue for 1 year.

Lastly, a contract has been signed for a cost-earnings study of the tuna longline, bottom fish, and ika-shibi fisheries in Hawaii. The study will involve a standard analysis of revenues and costs of the fishing fleets and an assessment of the impact of potential management measures. Work will commence upon completion of the survey design and receipt of OMB approval on the number of hours of public interviews.

Hawaii Skipjack Tuna Landings Continue Below Long-term Average

The November 1981 Hawaii landings of skipjack tuna were estimated at 64 MT, which is 62 MT below the November 1980 landings and 123 MT below the 1964-79 long-term average for November. The cumulative landings from January through November were estimated at 2,095 MT, which is 453 MT above the 1980 landings for the same period and 1,784 MT below the 1964-79 long-term average for the same period.

PELAGIC RESOURCES INVESTIGATION

Plans Almost Complete for Second Squid Research Cruise

Tamio Otsu, Chief of the Pelagic Resources Investigation, and Walter M. Matsumoto, Fishery Biologist, report that plans and arrangements for the second joint squid research cruise on the University of Hokkaido's research and training vessel, Hokusei Maru, have almost been completed. Final cruise plans have been completed and distributed to the Southwest Fisheries Center, State Department, Coast Guard, Hawaii County Government, Western Pacific Regional Fishery Management Council, Western Pacific Program Office (WPPO), cruise participants, and other interested parties. Preliminary contact with the Coast Guard has been made to arrange for communication support. The radio contact schedule will be finalized within the next few days.

Observers planning to participate in the research cruise include: Dr. Richard Young, University of Hawaii (UH); John Shears, graduate student, UH; and Eugene Nitta, Marine Mammal Coordinator, WPPO. The local fishing industry has also been invited to send a representative as an observer.

* * * * * * * * * *

Fishery Biologist Walter Matsumoto has completed reviewing and editing the revised skipjack tuna (Katsuwonus pelamis) synopsis authored by Matsumoto and Fishery Biologists Dr. Robert Skillman and Dr. Andrew E. Dizon. New illustrations for the revised manuscript are being prepared by Scientific Illustrator Tamotsu Nakata.

In addition, Matsumoto prepared a work proposal for a preliminary background study on the effects of deep seabed mining on the larvae of fishes, particularly those of economic importance, e.g., tunas and billfishes. He is also revising a manuscript on purse seining around rafts in the Philippine Islands.

DATA MANAGEMENT AND TECHNICAL SERVICES

Honolulu Laboratory Data and Word Processing Capabilities Expanding

Fishery Biologist Fletcher V. Riggs, in cooperation with Computer Systems Analyst David Hamm, Fishery Biologists Dr. Robert Skillman and Ray F. Sumida, and Research Assistant James C. Cooper, completed a report to Laboratory Director Richard Shomura on the current inventory of socio-economic data maintained by the Honolulu Laboratory, with particular emphasis given to data security. The report described current data handling procedures and suggested means of improving data security.

Riggs also reported further progress in expanding word-processing and data entry capabilities through the use of the computer facilities at the East West Center (EWC). Direct telecommunications lines were installed between EWC and the Honolulu Laboratory to replace existing telephone company lines (which have proven unsatisfactory) used for the word processors. The new arrangement also provides the additional lines necessary for a key-to-disk data entry system. There are currently two CRT terminals and a printer in operation for word processing and four additional CRT terminals and another printer should be operational in December for data entry. Funding for the data entry hardware was provided by SWFC's Fishery Information Network (FIN) program.

* * * * * * * * * *

Research Assistant Ronald Antinoja joined the Laboratory staff to assist in the development and implementation of the data management system for the RAIOMA Task.

LA JOLLA LABORATORY

Coastal Fisheries Resources Division

New Book on Fish Larvae is Written by Coastal Division Staff Members

Dr. Reuben Lasker, Chief of the Coastal Fisheries Resources Division, announced the publication this month of the University of Washington Press book, Marine Fish Larvae: Morphology, Ecology, and Relation to Fisheries. The book was co-authored by four fishery biologists at the Southwest Fisheries Center: Drs. Lasker, Paul Smith, John Hunter, and Geoff Moser. In the book, Smith discusses fisheries on coastal pelagic schooling fish, using the Pacific sardine and northern anchovy as examples; the statistical aspects of sampling and problems of using different sampling tools are also described in detail. Hunter draws upon his extensive background in research on fish larvae to discuss the feeding ecology and predation of marine fish larvae. Lasker, who served as editor as well as co-author of the book, contributed a chapter discussing his current ideas on the role of a stable ocean in larval fish survival and fish recruitment. In a final chapter, Moser discusses the morphological and functional aspects of marine fish larvae, and gives many examples of the diversity to be found in these early life stages.

LARVAL FISHES, COASTAL EAST PACIFIC PROGRAM

Onset of Schooling in Larval Anchovy Determined in the Laboratory

Dr. John R. Hunter, Program Leader, reports that he has completed a preliminary draft of a manuscript describing the onset of schooling in larval anchovy. The study was done cooperatively with Kathleen M. Coyne, student intern from Southampton College, Long Island University, New York.

In the larval stage, the most important benefit of schooling may be a reduction in predation and cannibalism; facilitation of the search for food and timing of vertical migration might be additional benefits. Identification of the larval size at which schooling begins is therefore necessary for a proper understanding of the effects of predation, cannibalism, and food abundance on size-specific mortality rates.

Analysis of the results of Hunter and Coyne's study indicates that schooling in anchovy begins when the larvae are between 11 and 12 mm and is well established by 13-15 mm. The onset of schooling closely parallels an increase in the patchiness of larvae in the sea (Figure 1) as determined by Roger Hewitt, NOAA Corps Officer stationed at the Southwest Fisheries Center. Measurement of patchiness may therefore be the best method for estimating the onset of schooling in marine fish populations.

Hunter and Coyne noted that the onset of schooling occurs during the period that the duplex retina in the eye is formed and when major changes are occurring in the respiratory and locomotor systems.

These structural developments may set the stage for the onset of schooling but external factors such as predator attack can trigger the event in the sea. After the onset of schooling, the duration that larvae remain in cohesive groups continues to increase throughout the larval and juvenile stages as such factors as food search and feeding have progressively less effect on the maintenance of sch ol structure.

Staging Anchovy Larval Fish by Eye Pigmentation to Aid in Estimating Larval Mortality

A length-age growth curve is often used to age juvenile and adult fish collected from the field. However, little is known about the growth pattern of larval fish in the yolk-sac period. In July 1981, members of the SWFC's Larval Fishes, Coastal East Pacific Program and Multispecies Taxonomy Program conducted an experiment to generate data on the length-age relationship of yolk-sac larvae of northern anchovy at three different temperatures. An attempt was also made to stage yolk sac larvae after hatching according to the extent of eye pigmentation. Analysis of the data by Mathematician Dr. Nancy Lo indicated that the predictability of larval age from observed length and the developmental stage of the eye pigment was much more accurate than when only lengths were used.

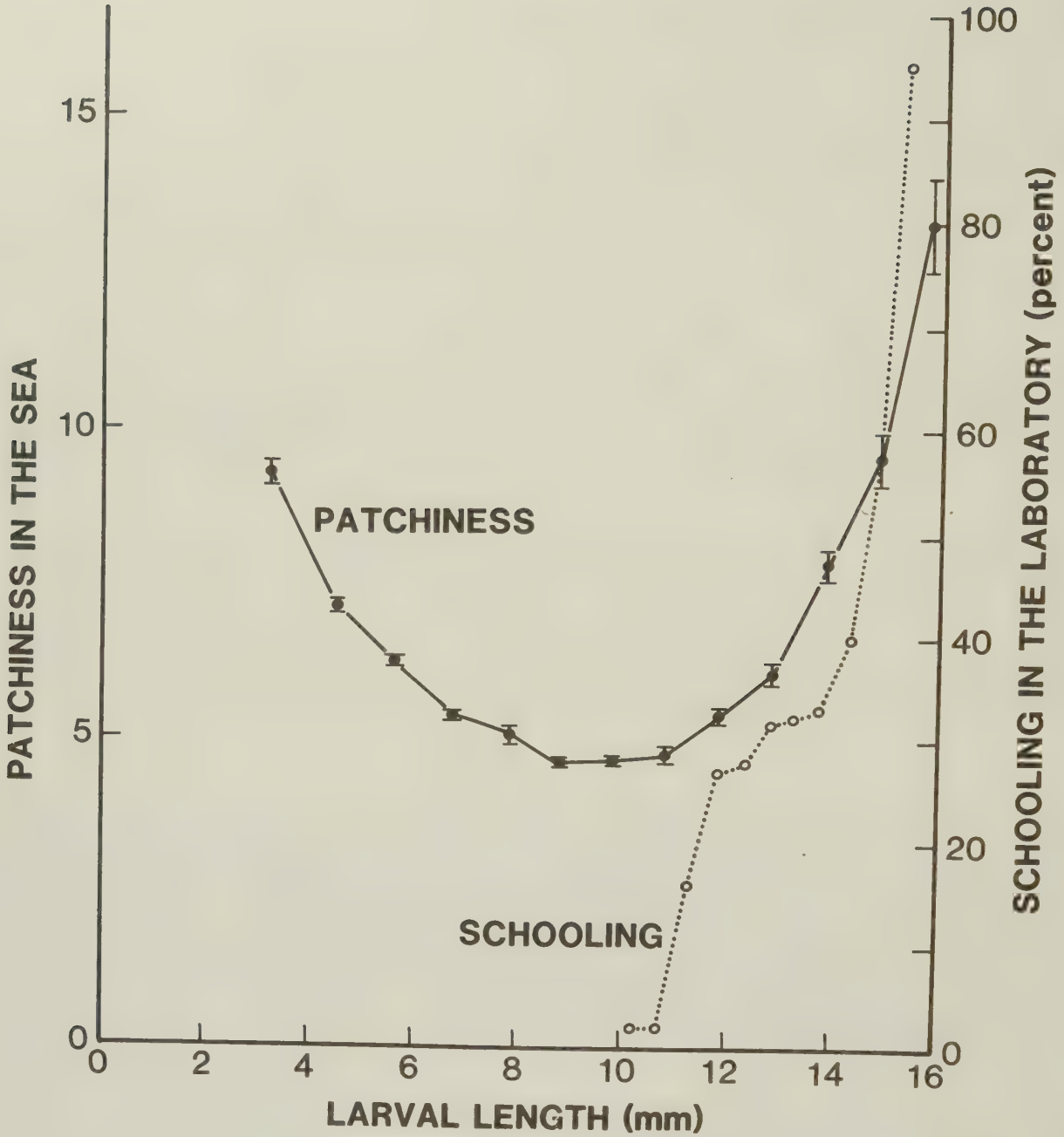

Figure 1. Lloyd's (1967) index of patchiness as a function of anchovy larval length, where patchiness measures the degree of departure of larvae distributions in the sea from a random dispersion (from Hewitt, 1981b), and the onset of schooling in the laboratory, where schooling is the mean percentage of the observation period that larvae swam in parallel alignment (approximately one body length or less apart).

Eye pigmentation was first examined by the late David Kramer. Following Kramer, Dr. Geoff Moser, Leader of the Multispecies Taxonomy Program, defined four stages of the eye pigmentation as: Stage I - no pigment; Stage II - pigment patch on the anteroventral margin of the eye; Stage III - pigment patch on the posterior margin of the eye; and Stage IV - pigment patch on the lateral surface of the eye, beginning with a patch at the pupil.

Yolk sac larvae reared at 16.5°C were subsampled for staging. The age (elapsed time), stage assigned, and the average live length from different samples at the same elapsed time were analyzed. A simple nonlinear model was assumed, with age (Y) as dependent variable and the length (X_1) and Stage (X_2) as independent variables:

$$y = a.x_1^{b}1.x_2^{b}2.e$$

When the length is the only independent variable, then

$$y = a.x_1^{b}1.e$$

To determine whether length, stage, or both gives the best prediction of the age, equations (1) and (2) were fit to the data set after logarithm transformation on the original data was performed. (Stages III and IV are combined as one stage, called Stage III, because no difference in age was found between these two stages. Thus X takes values of 1, 2, and 3.) When both length and stage are used, we obtain

$$\ln y = 3.48 + 0.597 \ln x_1 + 0.472 \ln x_2,$$

with $r^2 = 0.83$ and $s = 0.11$.

When only length is used, we obtain

$$\ln y = 2.3 + 1.82 \ln x_1,$$

with $r^2 = 0.55$ and $s = 0.17$.

Comparison of the above two equations indicates that an increase of 0.28 in r^2 is contributed by the inclusion of larval stages.

Analysis of the raw data shows that for a given preserved length, fish of the same length could belong to different stages (Table 1); thus, they should be of different ages, a situation expressed by equation (1) but not by equation (2). For example, using equation (1') to predict the ages of three fishes of length 3.5 mm, with one fish each at Stage I, II, and III, gives ages of 69, 95.69, and 115.87 hours, respectively. Using equation (2') would give all three fish a predicted age of 98.94 hours.

Table 1. Sample counts of larval fish of northern anchovy by age, stage, and length at 16.5° C.

Mean age (elapsed time) hour	Stage	Preserved length (mm) 2.0	2.5	3.0	3.5	4.0	4.0	Total
63	I	7	44	70	3			124
95	II	1	8	92	90			215
121	III			13	45	62	1	121
Total		8	52	175	138	86	1	460

The ability to predict age based upon eye pigment development stages is encouraging. The application of the technique to field data may prove useful in defining the shape of the mortality curve for anchovy yolk-sac larvae, a critical step in eliminating larval mortality in the laboratory.

Evacuation Rates of Larval Herring Studied

This month Fishery Biologist Gail Theilacker analyzed data on evacuation rates of larval herring as part of an ongoing series of experiments examining feeding and growth in larval fish. The data being analyzed were collected during a laboratory study of feeding, growth, and mortality of the Baltic herring, Clupea harengus, which was conducted at the Danish Institute for Fishery and Marine Research in Copenhagen, Denmark (details of this study are given in the July 1981 issue of the SWFC Monthly Report).

During the study it was found that at 11°C, the Baltic herring hatched at a standard length (SL) of 7-8 mm and a mean weight of 80 g. Their average growth in length was 3% per day; growth in weight was about 12% per day. The larvae were fed wild plankton which was available sporadically from day 2 through day 14; thereafter, food was available daily. Food in the stock tanks and test tanks was supplemented with the rotifer, Brachionus, when plankton was not available. Brachionus was considered to be a suitable food substitute for young herring larvae because they fed on wild rotifers and did not switch to feeding on copepods until after day 14. The feeding incidence was 8% on day 2 and 45% on day 3 (hatching = day 0).

To determine evacuation rates, larvae with full guts were transferred from a stock feeding tank to a test tank containing dyed, live plankters at varying densities, including zero prey. Digestion time was considered to be ended when no natural prey remained in the gut. In each experiment, all of the prey items in the larvae's guts were measured in order to determine the evacuation rate later in terms of mg dry weight of prey cleared through the gut per hour. These rates will be calculated for all size classes of herring larvae.

Evacuation rates for larvae feeding on Brachionus, from first-feeding to 2 weeks of age, ranged from 1.5 to about 2.5 hours (Table 1). Rates appeared to be independent of the tested prey densities, which varied from 3 to 20 prey/ml. However, at zero prey, larvae required more than 4.5 hours to clear the gut. Low copepod densities (0.3 - 0.4/ml) were used to test evacuation rates of older larvae; young larvae did not fill their guts at these lower prey densities. It took 4-5 week-old larvae about 2 hours to digest a full gut of copepods, the same amount of time younger larvae needed to digest a full gut of rotifers (Table 1). Evacuation time decreased to about 1 hour for 6-week-old larvae. Whereas feeding increased the evacuation rate in younger larvae, the rate remained the same for feeding and nonfeeding older larvae. In general, the gut clearance time for herring larvae from first-feeding through 5 weeks of age was about 2 hours.

Table 1. Evacuation rates for larval herring[1].

Age (days)	$\bar{x}$ SL (mm)	Prey density (#/ml)	Gut clearance time (hours)
PREY = Brachionus			
3	8.9	20.0	2-<3
4	9.0	3.6	2.5
8	10.9	15.5	1-1.7
8	10.9	5.5	1.5
8	10.9	0	>4.5
13	11.7	3.6	2
14	11.2	3.1	2-2.3
14	11.3	3.1	1.8
PREY = Copepods			
25	15.2	0.3	2.2
25	15.2	0.4	2.0
37	17.8	0	2.0
38	19.9	0.3	<1.8
41	20.8	0	1-1.3
42	17.5	0.3	0.9
42	18.0	0.3	1.0
42	18.0	0	>1.0

[1]All larvae tested had full guts.

The technique Theilacker used to determine evacuations rates relies upon using larave with full guts at the beginning of the experiment. However, herring larvae, unlike northern anchovy larvae, generally do not fill their guts more than 50% full. Herring only fill guts at high prey levels, i.e., the first daily addition of food. The time required for herring larvae to fill their guts at high prey levels decreased with age, from 1.5 hours for

first-feeding larvae to 0.5 hours for 6-week-old larvae. This tendency for these larvae to only partially fill their guts makes the application of these experimental results to wild larvae questionable. Another series of experiments was therefore conducted using larvae with partially filled guts.

Three-week-old larvae with one or two prey in their guts were transferred to test tanks containing dyed prey at several densities ranging from 0-1.5/ml. The time needed by feeding larvae to digest one copepod ranged from 0.6 to less than 0.9 hours (Table 2). The average time needed to digest a full gut (four copepods) was 2 hours (0.5 h/copepod). Thus a prey item may remain longer in a herring gut when the gut is less than full.

The digestion rate differed between larvae feeding on copepods (Table 1) and on Artemia nauplii (Table 2). In 3-week-old larvae, a feeding larva will digest a gut full of copepods in about 2 hours while a nonfeeding larva takes about 2.2 hours. Larvae of the same age digest a gut full of Artemia in 3 - 7+ hours even though the volume of a full gut in both experiments appeared to be the same (Table 2). Thus, it takes 1.5 to 3.5 times longer for a herring larva to digest a meal of Artemia than one of copepods. In addition, the digestion rate of Artemia-fed larvae appeared to be dependent on prey density: Artemia were not completely digested at the lowest densities (0.1 - 0.3/ml; Table 2; Werner and Blaxter 1980). In contrast, copepods were always completely digested in the larval hindgut.

Table 2. Particle residence time for larval herring.

Age (days)	$\bar{x}$ SL (mm)	n.	Prey density (#/ml)	Feeding rate (#/hour)	# prey in gut	$\bar{x}$ volume prey (10^7 μm^3)	Gut clearance time (hours)	Time per prey (hours)
PREY = Copepods								
21	13.33	15	0.7	1-3	2	20	1.25	0.6
21	12.53	13	1.5	2-6	1	10	<0.9	<0.9
21			0	-	1	10	1.8	1.8
25	15.2	19	0.4	2	*4	40	2.0	0.5
PRAY = Artemia nauplii (Werner and Blaxter, 1980)								
21	14.0		3.0		*7	49	3-5	0.4-0.7
21	12.7		0.3		*6	40	>7	>1.2

*Full.

Theilacker also observed differences in the digestion process between larvae feeding on copepods and those feeding on Artemia nauplii. In herring

larvae feeding on copepods, digestion of the prey begins in the intestine at the juncture of the foregut and the midgut, where the ducts from the liver and the pancreas join the intestine. The prey, usually one but sometimes two food items, lodges at this juncture; after the copepod shows signs of internal dissolution, it is moved along the intestine and comes to rest at the posterior hindgut. Partially digested copepods are stacked up in the hindgut until digestion is complete. When the herring gut is not full, it takes from 7 to 11 seconds for an ingested copepod to reach the juncture; when the gut is full, the time to reach the juncture is about 5 minutes but no digestion occurs during this period. A copepod is digested at the juncture for about 2 to 6 minutes; it then takes 5 to 11 minutes for the copepod to reach the anterior end of the food plug in the hindgut. Copepods in the posterior hindgut are completely digested.

The mechansim for the digestion of Artemia by larval herring differs from that for copepod prey. Although the width of the Artemia nauplius is similar to that of copepods, ingested Artemia never rest at the digestion juncture but pass directly to the hindgut. The passage time from ingestion to the anterior portion of the food plug is 2-3.5 minutes for Artemia, compared to 12 minutes for copepods. Furthermore, unlike copepods, Artemia in the posterior hindgut never appear to be completely digested.

COMMERCIAL AND RECREATIONAL FISHERIES RESEARCH FOR MANAGEMENT PROGRAM

Revision of Anchovy Management Plan Continues

This month Dr. Gary Stauffer, Fishery Biologist, Dr. Daniel Huppert, Industry Economist, and Alec MacCall, California Department of Fish and Game Marine Biologist stationed at the Center, continued to work on a complete revision of the anchovy management plan as requested by the Pacific Fishery Management Council. The primary accomplishment during November was a reinterpreted time series of anchovy spawning biomasses developed from combined egg and larva census information. The new series agrees substantially with the independent aerial and acoustic survey estimate of anchovy abundance. This agreement lends support to the new interpretation of larva census data, which recognizes variability in the ratio of larva abundance to spawner abundance caused by year-to-year variability in egg and larva mortality rates.

MacCall and Statistician Susan Picquelle are modifying a non-linear computer fitting routine developed by Huppert for estimating parameters of simple year-to-year population transition models using nonconventional fitting criteria. Since the biomass measurements are subject to statistical error, an error-in-variables model is postulated with both dependent and independent variables being subject to the error. Picquelle is adapting the confidence interval approximation methods for the Marquardt-Levenburg algorithm to the fitting procedure.

Editing of AMRMS Data Continues

Computer Specialist Susan Iacometti reports that the Aerial Marine Resources Monitoring System (AMRMS) data for 1980 are about halfway through the editing process. The new updates have been moved from the UCSD Burroughs computer to the VAX computer, and new methods are being developed to cut costs and problems of data transfer, including the use of the General Electric Terminet terminal/printer.

Current use of the system is light, with requests by Dr. Paul Smith, Fishery Biologist in the Coastal Division, and Dr. George Hunt, University of California at Irvine, being delayed until the AMRMS data base is updated through 1980.

Oceanic Fisheries Resources Division

MARINE MAMMAL BIOLOGY PROGRAM

SWFC Hosts International Symposium on Cetacean Reproduction

A symposium on Cetacean Reproduction sponsored by the National Marine Fisheries Service (NMFS) and International Whaling Commission (IWC) and hosted by the Southwest Fisheries Center was held at Scripps Institution of Oceanography, La Jolla, California, November 28-31, 1981. The symposium, convened by Drs. William F. Perrin, and Douglas DeMaster, SWFC, and Robert Brownell, U.S. Fish and Wildlife Service, was attended by approximately 150 experts and interested guests who came from around the world to review information on cetacean reproduction and its use in stock assessment and management.

Approximately 60 papers were presented at the symposium, under five topic sessions: 1) Review of cetacean reproduction, 2) Problems and new approaches in methodology, 3) Case studies of populations, 4) Are cetacean reproductive rates density dependent?, and 5) Behavior, functional anatomy and physiology of reproduction. SWFC scientists who contributed papers included Drs. Perrin, DeMaster, Al C. Myrick, Jr., Tim D. Smith, and Steve Reilly, and Mr. Wayne Perryman (please see Marine Mammal Monitoring and Assessment Program, this issue, for additional Conference information). A 7-day workshop on cetacean reproduction (a report of which will appear in the December 1981 issue of the SWFC Monthly Report) followed the symposium. The IWC plans to publish the symposium papers and a report of the workshop.

Techniques to Estimate Average Age of Marine Mammals at Sexual Maturity Reviewed

Dr. Douglas DeMaster, Leader of the Coastal Marine Mammal Project, has completed a review of five techniques used to estimate the average age at

sexual maturity (ASM) of marine mammals. In the review, DeMaster compares the estimates obtained when the five techniques are used on identical data, and discusses the differences among these estimates. He demonstrates that the three most common techniques in use rely on the percent of sexually mature animals at age and are equally sensitive to random variation. He concludes that no one estimating technique is superior for use in detecting population differences. DeMaster recommends that investigators who report on estimates of ASM should provide a complete description of the technique used to estimate ASM; confidence intervals as well as the point estimates should also be provided.

Marine Mammal Carcasses Salvaged for Research

Dr. Douglas DeMaster reports that during the period October 27 through November 27, the Marine Mammal Salvage Program collected 12 marine mammal carcasses, including 5 California sea lions (Zalophus californicus) from San Clemente Island. The others, collected from San Diego County beaches, included 1 harbor seal (Phoca vitulina), 1 bottlenose dolphin (Tursiops truncatus), and 5 California sea lions.

Necropsy was performed on all of the animals. No extraordinary results were obtained except for the dolphins. The bottlenose dolphin was determined to have been attacked by sharks, but the wounds observed may have been inflicted after death. Mass tumors near the pancreas, a metal spring in the stomach, and an intestinal tapeworm found in this specimen may have contributed to its death.

Study Begins on Feeding Habits of California Sea Lion

In a study to estimate the biomass of rockfish and squid consumed by California sea lions, Sandy Hawes (under contract to SWFC) has been reviewing the literature and working with researchers along the west coast on the identification of rockfishes and squids from otoliths and beaks, respectively. It appears that juveniles of the rockfish, Sebastes paucispinis, S. jordani, and S. goodei are the primary prey species consumed by California sea lions. Hawes is currently concentrating on studying various scientific collections containing juvenile specimens of these species in order to obtain a relationship between otolith size and body weight of rockfish.

The squid species most important in the diet of the California sea lion is Loligo opalescens Relationships between beak length and mantle length, and between body weight and mantle length, have been reported in the literature for this species; Hawes is investigating other sources of information as well.

California Sea Lion Scat Analyses Begin

This month Mark Lowry, Biological Technician with the Coastal Marine Mammal Project, began processing scat samples collected from sea lion haul-out areas on San Clemente Island to extract fish otoliths, squid beaks, and other

hard parts for identification of prey. He encountered a problem in completely separating the fecal matter from the hard parts because of the dried-out condition of the samples. Lowry reports, however, that the problem may be solved by using an emulsifying technique developed recently by S. Tracey of the Northwest and Alaska Fisheries Center.

Monthly Growth Rates, Month of Birth Determined for Northern Offshore Spotted Dolphins

Dr. Albert C. Myrick, Jr., Leader of the Marine Mammal Age Determination Project, has concluded a study in which the ages, in months, of 350 northern offshore spotted dolphins (Stenella attenuata) were determined by counting monthly layers in the teeth. A plot of body lengths versus months of age yielded very tight growth curves for the small sample. Birth months and birth years for specimens of the sample were determined by subtracting months of age from dates of death. Comparisons of dolphin birth months by area of catch suggest that spotted dolphin herds or herd groups may have discrete seasonality patterns in reproduction.

Myrick's findings were presented at the Symposium on Cetacean Reproduction held this month in La Jolla, California.

MARINE MAMMAL MONITORING AND ASSESSMENT PROGRAM

Program Scientists Present Papers at Cetacean Reproduction Conference

Several members of the Marine Mammal Monitoring and Assessment Program staff presented papers at the Cetacean Reproduction Symposium, held in La Jolla, California, November 28-31 (see Marine Mammal Biology Program, this issue, for additional Conference details). Dr. Tim Smith, Program Leader, discussed a method of estimating the population level giving maximum net productivity, based on his earlier work on estimating historical population sizes. He used data for three spinner dolphin populations as an example of the method. LCDR Wayne Perryman, NOAA Corps assigned to the La Jolla Laboratory, with Phil Hammond and Mike Scott of the Inter-American Tropical Tuna Commission (IATTC), presented a description of the use of high resolution aerial photography to measure body length of dolphins. The use of this photographic technique, which earlier had been shown useful in determining dolphin school size, was described for use in determining length of dolphins and for estimating the number of calves in a school. The goal of this research, being conducted jointly with the IATTC, is to estimate gross reproductive rates for dolphin populations in the eastern tropical Pacific. Dr. Steve Reilly, National Research Council/NOAA Fellow, described the results of his dissertation research on the California gray whale population. His analysis of data available for estimating net recruitment rates showed that the population has a rate of increase of between 3 and 4%, when the take from a Soviet subsistence fishery is accounted for.

Study on Relative Abundance of Dolphins Reviewed

This month Tom Polacheck visited the Southwest Fisheries Center to review his work on relative abundance of dolphins with Marine Mammal Monitoring and Assessment Program staff members. Polacheck is a SWFC student-employee working on a doctoral degree under Dr. Peter Frank at the University of Oregon. He is analyzing data on rates of sightings of dolphins collected by observers on tuna purse seiners in the eastern tropical Pacific. The study is directed toward the possibility of using sighting rate data to measure relative dolphin abundance.

TUNA/BILLFISH RESOURCES PROGRAM

Condition of Atlantic Tuna and Billfish Stocks Assessed by ICCAT

This month Center Director Dr. Izadore Barrett, Fishery Biologists Dr. Norman Bartoo and Dr. Gary Sakagawa, and Industry Economist Dr. Samuel Herrick attended the 1981 meeting of the International Commission for the Conservation of Atlantic Tunas (ICCAT) Standing Committee on Research and Statistics (SCRS). The formal meeting was held in Tenerife, Canary Islands, Spain, from November 3 to 11. Prior to the meeting, SCRS scientists prepared status of stock reports on Atlantic tuna and billfish stocks to assist the Commission in identifying needed conservation measures.

The Committee's assessment of the condition of yellowfin tuna stocks stated that on an Atlantic-wide basis, yellowfin tuna appear to be heavily exploited, with current catches approaching the upper estimate of Maximum Sustainable Yield (MSY). While the Committee had no specific recommendation for additional management of yellowfin tuna at this time, it did recommend the continuation of investigations of alternative management schemes designed to enhance yellowfin tuna yields; these were begun in 1980 and were developed further in 1981.

The SCRS appraisal of bigeye tuna stocks indicates that on an Atlantic-wide basis, bigeye tuna are currently being exploited within the range of estimated MSY's. Considered separately, the fishery for bigeye tuna in the northern Atlantic is currently operating at a level below the estimated MSY for a distinct northern stock, while the fishery in the south is operating at a level close to the estimated MSY for a distinct southern stock. The Committee offered no new management recommendations for bigeye tuna at this time, but recommended that alternatives to the current minimum size regulation for bigeye tuna continue to be investigated.

The Committee's assessment of skipjack tuna resources remains relatively unchanged from that of last year. Skipjack tuna in the eastern Atlantic are currently exploited at a higher level than in the western Atlantic. Although the true potential yield from the resource is still unknown, available

information suggests that it is greater than the catch levels currently realized. There were no management measures recommended for skipjack tuna at this time. However, the Committee noted that because skipjack tuna are frequently caught together with yellowfin and bigeye tunas, management aimed at these latter species will likely impact skipjack tuna catches.

The SCRS appraisal of albacore tuna stocks indicated that the northern stock is currently being exploited below its estimated MSY while the southern stock appears to be fished at a level near its MSY. There were no management recommendations made for albacore tuna at this time.

The SCRS assessment of the bluefin tuna resource suggests that while bluefin tuna in the eastern Atlantic are not currently threatened with over-exploitation given the current pattern of the fishery, fishing has reduced the resource in the western Atlantic to dangerously low levels. Based upon this assessment, the Committee recommended that current minimum size and fishing mortality regulations be maintained in the eastern Atlantic, and that catches of adult and juvenile bluefin tuna in the western Atlantic be reduced to as near zero as feasible in 1982. On the other hand, if bluefin tuna are to be managed on an Atlantic-wide basis, the Committee recommended that 1982 catches of adult fish be held to as near 9,500 MT as feasible, and that catches of juvenile fish be reduced to as near zero as feasible. This recommendation was based upon evidence showing low levels of abundance for both juvenile and adult fish.

While the exact status of Atlantic billfish (blue marlin, white marlin, sailfish, and swordfish) resources remain unknown, the Committee expressed concern over the low catch-per-unit-effort (CPUE) levels for both blue and white marlins in recent years, and the impact of increased levels of effort on these resources. The Committee noted that significant progress has been made in improving and updating billfish data bases; however, there is still insufficient information to make firm evaluations on the condition of the resources and the need for management at this time.

Reports were also prepared on the multispecies aspects of fisheries for both temperate and tropical tuna-like species. The Committee stressed the need to develop a plan that addresses ecological interaction issues and to establish an analytical framework for multispecies fishery assessment and management investigations.

Size and Species Compositions of Foreign-Caught Atlantic Tunas Examined

Industry Economist Dr. Sam Herrick presented a paper, "Size and species compositions of Atlantic tunas from imports landed in Puerto Rico during 1980," at the 1981 meeting of the International Commission for the Conservation of Atlantic Tunas (ICCAT). Standing Committee on Research and Statistics (SCRS), at Tenerife, Canary Islands, November 3-11, 1981. The paper described results of length-frequency and species composition sampling of foreign-caught, imported Atlantic tunas transshipped to Puerto Rico during 1980. The Puerto Rican transshipment size composition sampling results were

compared to the results of landings sampled in Tema, Ghana, where the transshipments originated, using goodness-of-fit tests. Estimated length frequencies obtained in Puerto Rico by sampling yellowfin and bigeye tuna transshipments of the Tema-based baitboat fleet were tested against expected length frequencies, based upon corresponding landings sampling conducted in Tema. The tests indicated that, in the majority of the cases, statistically significant differences exist between the results of the Puerto Rican and Tema sampling programs.

Bias in the Traditional Method of Estimating Age-Frequencies Investigated

Dr. Norm Bartoo, Fishery Biologist, presented a paper entitled, "Stochastic age-frequency using the von Bertalanffy growth equation," at the ICCAT Standing Committee on Research and Statistics meeting held November 3-11 in Tenerife, Canary Islands. The paper, co-authored by Bartoo and Keith Parker, Creative Ideas, San Diego, details a technique whereby the bias inherent in the traditional method of estimating age-frequency from length-frequency using the deterministic von Bertalanffy growth equation is removed by incorporating a stochastic element in the von Bertalanffy relationship. The stochastic element is based on estimated probabilities of lengths by intervals at age; the probabilities are estimated from variances in lengths-at-age. Based on age-length samples from the Pacific bonito fishery, the stochastic method gives improved age-frequency estimates over those obtained by the deterministic method.

1981 CYRA Yellowfin and Skipjack Catches Reviewed at IATTC Meeting

The 39th annual meeting of the Inter-American Tropical Tuna Commission (IATTC) was held this year in Paris, France, from October 19 to 21. Representatives from the six member countries (Canada, France, Japan, Nicaragua, Panama, and the United States) were present. Dr. Gary Sakagawa, Chief of the Oceanic Fisheries Resources Division, La Jolla Laboratory, SWFC, was a member of the U.S. delegation.

At the meeting Dr. James Joseph, Director of IATTC Investigations, La Jolla, California, presented IATTC research results and a summary of 1981 yellowfin and skipjack catches in areas under IATTC influence. Joseph reported that the 1981 year-to-date yellowfin and skipjack tuna catches within the IATTC's Yellowfin Regulatory Area (CYRA), as estimated from reports of IATTC monitored vessels, are below the average year-to-date catches for the period 1976 to 1980.

The November 1981 cumulative yellowfin tuna catch is 10% below the 1976-1980 average (Figure 1), and the cumulative skipjack tuna catch is 6% below the 1976-1980 average (Figure 2). However, while the 1981 cumulative yellowfin tuna catch through November is below the 5-year average, it is 10% greater than the 1980 estimated cumulative catch for the same period; the cumulative skipjack tuna catch through November is down 7% compared to 1980.

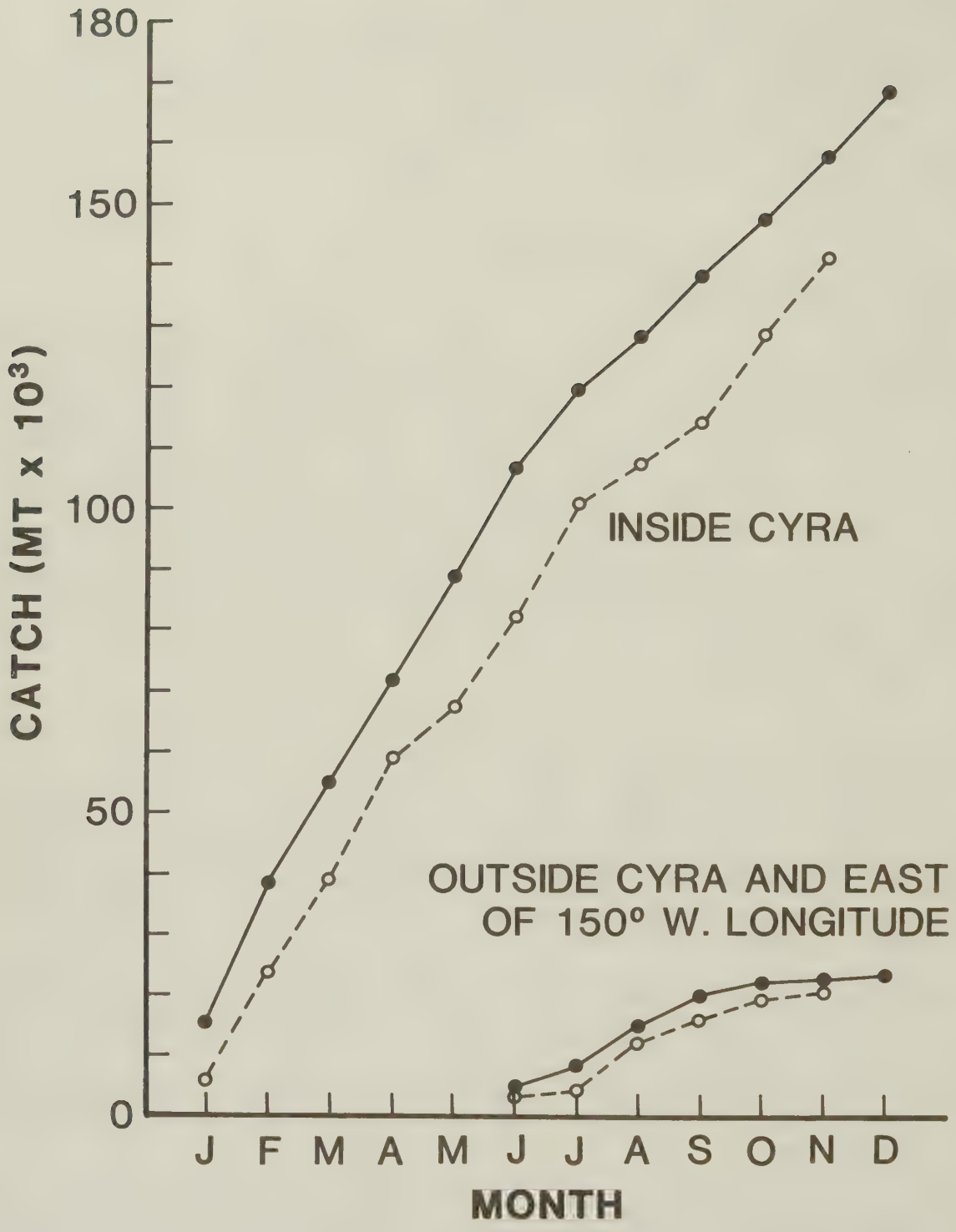

Figure 1. Cumulative yellowfin tuna catch: 1976-1980 5-year average (solid line) and 1981 (dotted line).

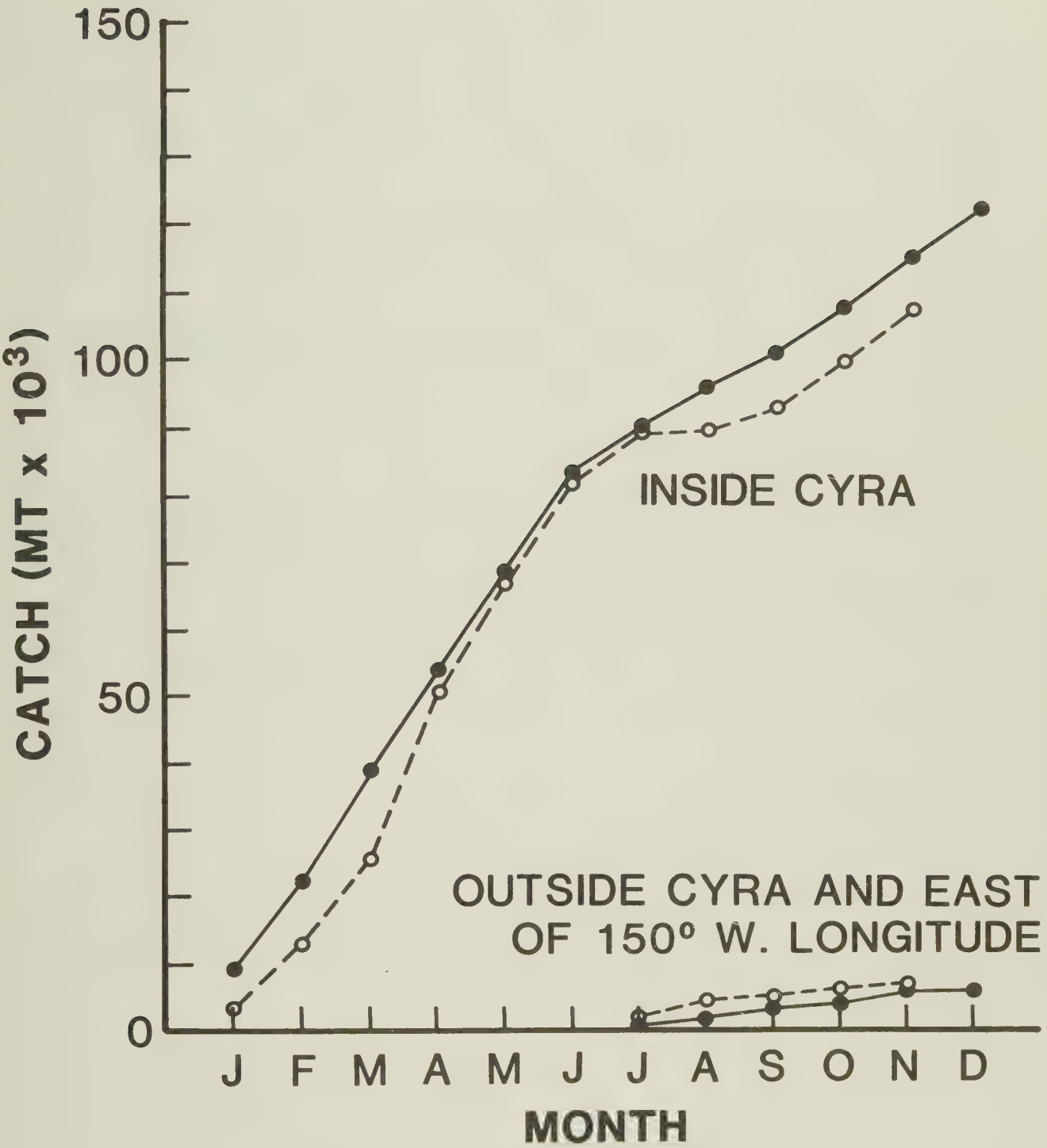

Figure 2. Cumulative skipjack tuna catch: 1976-1980 5-year average (solid line) and 1981 (dotted line).

In the area west of the CYRA and east of 150° west longitude, the combined yellowfin and skipjack tuna catch through November 1981 is 6% below that of the 5-year average from 1976 to 1980. Yellowfin tuna catches are down 9% while skipjack tuna catches are up 13%. The cumulative yellowfin tuna catch is down 8% compared to the catch for the same period in 1980; the cumulative skipjack tuna catch is down 56% compared to 1980, which was an unusually good year for skipjack tuna catches in the "outside" fishing areas.

According to Sakagawa, the Commission reviewed information which showed that the yellowfin tuna stock in the CYRA is overfished, relative to the estimated maximum sustainable yield of 175,000 short tons (st). The Commission therefore adopted a proposal to limit the 1982 catch to 160,000 st, with the possibility for two increases of 15,000 st each should the Director find that the stock can withstand these increases. This proposal would go into effect when the IATTC member countries agree on a 1982 management regime.

Status of Atlantic Tuna Fishery Sampling Program

During the period January 1, 1981 to December 1, 1981, six U.S. and three foreign tuna purse seiners fishing in the Atlantic Ocean unloaded in Puerto Rico. Sixty size composition samples were collected for the SWFC by Inter-American Tropical Tuna Commission personnel. The sampling distribution by species is as follows:

Species	Vessels sampled	No. of samples	No. of fish sampled
Yellowfin	9	23	1153
Skipjack	9	30	1502
Bigeye	4	7	211

Foreign-caught Atlantic tunas transshipped to Puerto Rico are sampled routinely for biological information by Biological Technician Eugene Holzapfel. Data on fork length, weight and species composition of catches are collected. The results of Holzapfel's sampling during the period January 1, 1981 to December 1, 1981 are as follows:

Species	Gear	No. of samples	No. of fish sampled	Tonnage sampled (MT)
Yellowfin	Baitboat	6	344	47.15
	Purse seine	12	807	2320.89
Skipjack	Baitboat	6	302	2294.57
	Purse seine	5	250	1291.48

Bigeye	Baitboat	7	263	61.80
	Purse seine	1	36	80.54

Biological specimens consisting of 248 gonads and 237 stomachs from western Atlantic-caught skipjack tuna are also being collected in Puerto Rico by SWFC personnel Eugene Holzapfel and Esteban Colon. These samples are being collected in order to conduct studies on maturity, fecundity, and feeding behavior in support of the International Commission for the Conservation of Atlantic Tunas (ICCAT) International Skipjack Year Program.

California Swordfish Analysis Complete

Fishery Biologist Earl Weber has completed an analysis of the 1979 swordfish data from the California harpoon fishery. Included in this analysis were estimates of catch, catch rates, effort levels, and mean weights by month and 10-minute fishing area, as well as weight frequencies and information on the behavior of swordfish. The results of this analysis have been sent to the California Department of Fish and Game, the agency responsible for the management of the resource.

Also completed is a software package designed to process and analyze the swordfish data and incorporate these data into a data base. This package will reduce processing time as data for subsequent years become available.

TIBURON LABORATORY

FISH COMMUNITIES INVESTIGATION

Western Groundfish Conference A Success

Dr. William Lenarz, Leader of the Rockfish Analysis Task, reports that the Western Groundfish Conference, held in Gleneden, Oregon, October 18-20, was a gratifying success. The Conference, the first of its kind, was designed to serve as a forum through which academic and management researchers involved in the study of groundfish of the West Coast could communicate. Approximately 95 scientists and industry representatives from the Pacific states, British Columbia, and the East Coast attended the Conference, which was chaired by Lenarz and Dr. Robert Francis, Northwest and Alaska Fisheries Center.

Forty-six papers were presented during the five technical sessions of the Conference, and future research on the widow rockfish was discussed during an informal evening session. Plans for future groundfish conferences were developed during a business session, where it was decided to hold the next conference in California during November, 1982. After that time, bi-annual conferences will rotate among the Pacific states and British Columbia. Chairing of the 1982 Conference will be Dr. Lenarz, Mr. F. Henry, California Department of Fish and Game, and Dr. Milton Love, Occidental College.

Members of the Fish Communities Investigation presented five papers at this year's conference: Peter Adams spoke of work done with Dr. Lenarz on the ability of fishermen to target on a specific species of groundfish; Candis Cooperrider talked of work with Dr. Lenarz on sample design for commercial landings of widow rockfish; Tina Echeverria described results of her studies on maturity of rockfishes; Dr. Edmund Hobson spoke of work done with Tony Chess on seasonal patterns in trophic relationships of the blue rockfish; and Dr. Lenarz described the Groundfish Management Team's assessment of the widow rockfish fishery.

Study Measures Impact of Seasonal Upwelling Patterns on Nearshore Ecosystems

This month, Investigation Leader Dr. Edmund Hobson, with Fishery Biologist Tony Chess and Fishery Technician Dan Howard, made a series of collections of some nearshore fish species at a study site near Albion, Mendocino County, California (Figure 1). Earlier study of trophic relationships of the blue rockfish, Sebastes mystinus, demonstrated that the dynamics of the nearshore ecosystem along the coast of northern California relate strongly to alternating seasonal patterns of upwelling and downwelling. Although that work has been completed, study continues which monitors the impact of these patterns on certain key organisms, including such major fish species as the black rockfish, Sebastes melanops, the lingcod, Ophiodon elongatus, the striped surfperch, Embiotoca lateralis, and the kelp greenling,

Hexagrammos decagrammus, as well as the prey of these fishes. The impact of the upwelling/downwelling cycle on recruitment patterns of juvenile rockfishes is also being investigated. The collections made this month by Hobson, Chess, and Howard included samples of gut contents from the key fish species, as well as collections taken with air-lift and plankton net which, combined with visual counts along established transect lines, will document present conditions along the northern California coast.

Figure 1. Ted Hobson and Tony Chess put to sea from their launching site at Albion, Mendocino County, for study of the near-shore ecosystem in waters along the northern California coast.

PHYSIOLOGICAL ECOLOGY INVESTIGATION

Study Completed on Effects of Zinc and Benzene on Striped Bass

Dr. Jeannette Whipple, Investigation Leader, reports that the laboratory experiment being performed by personnel from the California State Water Resources Control Board as part of the Cooperative Striped Bass Study has been successfully completed. The objective of the experiment was to determine interactions between benzene and zinc in affecting parasitized and

unparasitized striped bass. Effects on the immune system were emphasized in the study; the effect of parasitism on uptake of benzene and zinc was also examined. Samples and data from this experiment and from a similar experiment which was conducted previously, are now being examined. Plans have been made to hold a meeting of members of the Cooperative Striped Bass team on December 3 at Tiburon Laboratory in order to report on current progress and to discuss future directions of the research.

Striped Bass Pollutant Study Data Analyzed

Fishery Biologist Dr. Jeannette Whipple continues to work on analyses of data (approximately 250 variables for each fish) obtained from examinations and subsampling of adult striped bass captured in the field. Factor analysis is being used to explore correlations between the variables and to determine sets of related variables. Data for 3 years of sampling, representing approximately 500 fish from six different areas, are being examined. The refinement of the data will be followed by additional variance, covariance, and correlation-regression analyses. Finally, a reduction of the data will be done to determine those variables most suitable to monitoring. A recommendation will then be made for procedures to assess the health of the striped bass population in relation to selected pollutants. Data will also be used to delineate further hypotheses on the relationship of pollutants to reproduction, growth, and survival of striped bass; these hypotheses will be tested in the laboratory for possible cause-and-effect relationships.

Data examined so far show that there are correlations of petrochemicals with measures of reproductive capacity and viability, parasites, and factors measuring condition of the body, liver, gonads, other groups, and particularly, blood parameters. Correlations between petrochemicals (alkylated benzenes, cyclohexanes), heavy metals, polychlorinated biphenyls and other chlorinated hydrocarbons are also being determined.

FISHERIES DEVELOPMENT INVESTIGATIONS

Cruise to Test Trawl for Shortbelly Rockfish Postponed

This month a cruise chartered to test the catch selectivity of an "off-bottom" trawl was temporarily postponed due to bad weather. The commercial trawler, Oregon Beaver, was only able to complete 1 of 7 scheduled days of fishing before being forced to return to port. The vessel departed from Tiburon on November 11 with cruise leader Sus Kato and Lt. Pat Rutten, NOAA Corps aboard, as well as Albert Busalacci, a veteran fisherman hired by the Laboratory, to help with fishing operations during the cruise. Four tows were made with the trawl, which features a suspended foot-rope that theoretically allows the net to fish up to three feet off the bottom, even though standard bottom otter boards are used. The chief objective of the experiment was to learn if this trawl net could catch shortbelly rockfish while excluding other fish.

The first day of the cruise was dedicated to experimenting with the gear. The first two tows caught no fish: the net apparently never reached close to the bottom because the vessel was traveling too fast. The next tow, made at a slower speed, caught about two tons of chilipepper and shortbelly rockfish, with only a few flatfish, indicating that the gear can be made to fish selectively as designed. On the fourth tow, however, several tons of juvenile Dover sole were caught with a large number of midshipman and a few rockfish. Fathometer marks indicated that the sole may have been a few feet off the bottom. It is also possible that the net may have fished right on the bottom. However, the "fish marks" on the fathometer were not typical of shortbelly rockfish and program members are still confident that this species can be targeted successfully.

During the fourth tow, Mr. Busalacci was injured and the vessel made for Princeton Harbor to return him to shore. High winds came up the next morning and continued for 4 days, causing the cruise to be postponed. It has been rescheduled to begin on December 15.

Euphausiid Net Repaired

Repairs have been completed on the euphausiid trawl which was damaged during the successful fishing trials last month aboard the NOAA research vessel, David Starr Jordan. Consistent catch rates and good quality of samples from the Jordan cruise have increased industry interest, from the marketing standpoint, in developing a domestic fishery for euphausiids. A search for a suitable vessel has not been successful to date because of competition with other fisheries.

Sea Cucumbers Processed

Fishery Technician Sennen Salapare this month processed 4-1/2 pounds of the common California sea cucumber, Stichopus californicus, to send to a Hong Kong seafood broker who requested a sample. The cucumbers, obtained from a commercial fishery, were cleaned, boiled, and dried in the traditional way. A small fishery for sea cucumbers now exists at Santa Barbara, California, and an expansion is possible if the sample prepared by Salapare is judged acceptable. However, the net yield of the processed dried product was only 167 g, or 8% of the original weight, and the small size of the cucumbers may result in a product with little commercial value.

Interest In Octopus Fishery Grows

Lt. Patrick Rutten, NOAA Corps, delivered 25 Japanese-style box traps and one set of octopus longline gear to a commercial fisherman in Eureka, California this month. The trip to Eureka coincided with Lt. Rutten's participation in an Alternative Fisheries Workshop sponsored by the University of California Sea Grant Program. On the following day, Lt. Rutten presented the same talk to fishermen in Ft. Bragg, California. Interest in octopus fishery is high at this point, particularly in view of the poor Dungeness crab season and an increasing demand for octopus (O. dolfleini) by processors.

FISHERIES INFORMATION SYSTEMS AND AUTOMATIC DATA PROCESSING

Fishery Information Network - A General Description

In recent years there has been a greatly increased demand for data concerning fisheries in the western United States. In the past these data have been gathered piecemeal, with no comprehensive approach to collection and analysis. Fishery data in the Pacific area have been collected in various specialized data series, by different agencies, and to meet different specific needs. As a result, comparability of data between one geographical area and another, or between one time period and another for the same area, has been severely restricted or impossible. The Fishery Conservation Management Act, Marine Mammal Protection Act, Endangered Species Act and other acts have created new data and information requirements. Many of the information systems of the states, U.S. Territories, and the National Marine Fisheries Service are inadequate to meet these requirements, and there is an urgent need to upgrade, develop, and integrate the fishery information systems of these various agencies.

The information on the various federal NMFS and state fishery information systems is handled in a very complex manner. Data are collected in one geographical area, input into the computer in another area, processed in a third area, and retrieved in still another geographical area. Data are also collected through a variety of methods: fish tickets, dock sampling, fisherman interviews, logbooks, processor's reports, commercial license applications, vessel registration, year licenses, aerial sampling, coded wire tag recoveries, observers aboard vessels, and foreign catch reports. The quality, comprehensiveness, and timeliness of this information must be improved for the wide variety of users in the Pacific area. Public agencies and private organizations need reliable information in order to know what is happening and to make sound decisions.

The Fishery Information Network (FIN) was initiated in FY80 to help meet these new requirements for fishery information. The FIN is the main vehicle for management and scientific users to access and obtain fishery information in the Southwest area and is primarily sponsored by the Southwest Fisheries Center and Southwest Region, NMFS. The FIN will access and communicate timely, accurate, and quality biological, environmental, socio-economic, and legal data for research and management by performing the following activities: (1) the enhancement and modernization of existing fishery information systems; (2) the development and implementation of new fishery information systems; (3) the establishment of a communications network among the States' and NMFS data processing centers; and (4) the establishment of aggregated and summarized data banks. The successful functioning of the FIN can only be achieved through interactive cooperation among NMFS, the states, and the various councils and commissions which collect and use fisheries data.

The primary users of the FIN are defined as the Southwest Fisheries Center (SWFC), Southwest Region (SWR), Northwest and Alaska Fisheries Center (NWAFC), Northwest Region (NWR), Alaska Region (AKR), California Department of Fish and Game (CDFG), Oregon Department of Fish and Wildlife (ODFW),

Washington Department of Fish (WDF), Alaska Department of Fish and Game (ADFG), Hawaii Division of Aquatic Resources (ASAR), American Samoa, the Commonwealth of the Northern Mariana Islands, Guam, and the three Fishery Management Councils (including Advisory Panels, Scientific and Statistical Committees, and Plan Development Teams) - Pacific Fishery Management Council (PFMC), North Pacific Fishery Management Council (NPMC), and West Pacific Fishery Management Council (WPFMC). The FIN maximizes existing resources, establishes a communications network system between the various states, territorial islands, and federal fishery information systems, and enhances the strong interaction between agencies and users.

The FIN is being developed in a stepwise and modular fashion. The communications network development does not add to or alter existing systems without mutual agreement of all parties concerned. The FIN is able to handle multi-source data about fisheries and is flexible enough to fit all users. With FIN, users are able to compare data from one area or one source with another, or from one time period with another. The network permits the maximum use of the same basic data for many purposes.

The Fishery Information Network currently consists of three functional entities: the California FIN (CALFIN), the Pacific Coast FIN (PACFIN), and the Western Pacific FIN (WPACFIN). The PACFIN, WPACFIN, and CALFIN will be discussed in detail in the upcoming SWFC Monthly Reports for December, January, and February, respectively.

California Fishery Information Network Update

Fred Kellenberger, Data Systems Manager, reports that during November Norm Abramson, Director of the SWFC's Tiburon Laboratory, initiated the planning process for the port sampling study. Discussions have already been held with California Department of Fish and Game personnel on a cooperative development of the sampling project, Kellenberger met with CDFG personnel on November 10 to discuss the California Fishery Information Network (CALFIN) contracts for FY82. A major project of the Fishery Information Network (FIN) is the development and implementation of a credit card system to aid in gathering fishery data. Several statistical reports were developed this month for the 1981 California commercial fish landings; the reports display information on various species for different areas in California by month. (Please see preceding article for additional information on FIN and CALFIN.)

Western Pacific Fishery Information Network Update

David C. Hamm, Computer Systems Analyst at the Honolulu Laboratory, reported significant progress in the implementation of the Fishery Informaion Network (FIN) in the western Pacific area (WPACFIN). A week of meetings was held at the Honolulu Laboratory, with staff members from the Laboratory, Western Pacific Program Office (WPPO), Western Pacific Regional Fishery Management Council (WPRFMC). Guam Aquatic and Wildlife Resources Division, and the historical data compilation project contractors from American Samoa, Guam, and the Commonwealth of the Northern Mariana Islands in attendance. Data sets available in each of the island areas were discussed in detail and

decisions were made as to their suitability to automation and inclusion into FIN. Computer and documentation training was provided to appropriate individuals to facilitate future installation and operation of the microcomputer systems in each of the areas. The hardware was delivered by the East West Center (EWC) for the FIN hookup to their PDP 11/70. The EWC has received and installed its second 11/70 processor, and plans to have FIN connections made ahead of the December 31 schedule. The remaining three systems of microcomputer hardware and software were delivered, thus completing that procurement action.

Meeting Held to Discuss California Fish Landing Information

On November 19, Dr. Daniel Huppert, Industry Economist, Susan Iacometti, Computer Specialist, and Dorothy Roll, Systems Analyst, met with Eric Knaggs of the California Department of Fish and Game (CDFG) in Long Beach, California. The meeting concerned the 1977 and 1978 California fish landing information. A tape of the 1978 data will be generated by CDFG in a format specified by SWFC for use by researchers in the La Jolla Laboratory. For the 1978 data, John Davies, SWFC analyst stationed at the Southwest Region, will supply a summary tape for the Statistical Division of NMFS in Washington, DC. Because California landings by vessels are confidential, two summary reports will be generated in such a way that landings by particular vessels cannot be identified.

Center Personnel Attend Federal ADP Council Meeting

On November 13, Systems Analyst Dorothy Roll, NOAA Corps Officer Mark Sullivan, and Computer Specialists Rich Charter, Susan Iacometti, Frank Ralston, and Ken Wallace attended the Federal ADP Council meeting in San Diego, California. The purpose of the Council is to improve the management and use of Federal ADP resources by promoting the exchange of ideas and techniques among ADP users and by promoting the professional development of personnel through seminars. There were 57 attendees at the meeting, including government personnel and vendors such as DIGITAL and the Pacific Telephone Company. The speakers for the day's session on "ADP - A Look to the Future" were IBM personnel John Zachman and William Donnelly. The topics were "Information Systems - The Decade of the Eighties" and "Advanced Disk Storage Technology." The luncheon speaker, Dr. Laurie Broedling from the Navy Personnel and Research Development Center (NPRDC), spoke on productivity enhancements and the federal government.

SWFC Conducts Program Benchmarks on VAX

With the assistance of the Computer Center at the University of California, San Diego, the Southwest Fisheries Center this month conducted program benchmarks on the UCSD's VAX computer system. The program package was the same as that utilized in the benchmarks for the National Data Management Committee's report, "Comparative Analysis for Expanded Use by NMFS." The package included runs with indices ranging from 10 to 300,000 on integer arithmetic, floating point arithmetic, double precision arithmetic, single and

double precision intrinsic functions, encode/decode, butter input/output, fourier transforms, and sorts. The results of SWFC's benchmark indicate that the VAX costs are 70% less than the Northwest Center's Burroughs system.

Computer Services Contracts Under Review

Systems Analyst Dorothy Roll reports that the solicitations from the Department of Commerce (DoC) of bid packages for computer services contracts are under review by the contract officers at the University of California San Diego and the University of Hawaii. Upon their approval and submission of their cost structures, the packages will be expressed to DoC for the final signature. The contract period is from October 1, 1981 through September 1982, with option to renew through June 30, 1983.

Technical Study Group Meets to Discuss Filing System

On November 10, Systems Analyst Dorothy Roll met with members of the Technical Study Group to discuss the NOAA functional filing system. Attending the meeting were Frances Tonsich, Secretary-Stenographer; Lorraine Prescott, Editorial Assistant; Barbara Engstrand, Program Support Assistant; Julie Shoemaker, Clerk-Stenographer; and Virginia Hostler, Secretary. Questions raised during the October meeting on how to interpret the filing indices have been answered by the consultants at fisheries headquarters in Washington, DC. Procedure were suggested on the conversion to the mandated system with the least amount of interruption to on-going activities. A meeting will be held on December 15 to present and discuss progress reports on the conversion.

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ADP Operations hosted one technical user's meeting in November. Computer Specialist Frank Ralston gave instructions on protecting magnetic tapes from unauthorized users on the VAX system.

MISCELLANEOUS

HONORS AND AWARDS

SWFC Scientists Receive Outstanding Publication Awards from NMFS

This month Southwest Fisheries Center scientists received two of four awards given for outstanding publication by the Publications Advisory Committee of the National Marine Fisheries Service. The awards were given for papers published in the Fishery Bulletin and the Marine Fisheries Review in 1977 and 1978. W. F. Perrin, D. B. Holts, and R. B. Miller of the La Jolla Laboratory received an award for their 1977 paper, "Growth and reproduction of the eastern spinner dolphin, a geographical form of Stenella longirostris in the eastern tropical Pacific" (Fish. Bull., U.S. 75(4): 725-750). E. S. Hobson and J. R. Chess of the Tiburon Laboratory were honored for their 1978 paper, "Trophic relationship among fishes and plankton in the lagoon Enewetak Atoll, Marshall Islands" (Fish. Bull., U.S. 76(1): 133-153).

Tiburon Laboratory

On November 9, Fishery Biologist Susumu Kato and Administrative Officer Walburga L. Giguere received federal government length-of-service pins in a ceremony at the Tiburon Laboratory. Kato's award honored his 25 years of government service at the La Jolla and Tiburon Laboratories. Giguere's pin commemorated the 20 years she has served at Tiburon, having begun work during the Laboratory's first year of operation.

PUBLIC AFFAIRS

Honolulu Laboratory

On November 18, Honolulu Laboratory Director Richard S. Shomura participated in a panel discussion at the University of Hawaii; the discussion centered on various issues of conservation and commercial fishery development in the Northwestern Hawaiian Islands. Other panelist included Dr. Sheila Conant, University of Hawaii; Dr. Robert Shallenberger, U.S. Fish and Wildlife Service; Buzzy Agard, commercial fisherman and former member of the Western Pacific Regional Fishery Management Council; and Dr. Stanley Swerdloff, Hawaii Division of Aquatic Resources.

Tiburon Laboratory

On November 6, Dr. Jeannette Whipple, Chief of the Physiological Ecology Investigation, was interviewed by Robert Boyle, staff writer for Sports

Illustrated. Mr. Boyle is writing a two-part article on the status of the striped bass fishery on both the east and west coasts of the United States. Dr. Whipple gave Mr. Boyle a tour of the Laboratory, and discussed the striped bass research being conducted by Laboratory staff.

PRESS RELEASES

La Jolla Laboratory

November 2 - "Honolulu scientist wins Commerce silver medal."

SEMINARS

Honolulu Laboratory

November 13 - Foreign Vessel Observer William B. Barnett presented an informal slide show seminar on his experience as a foreign observer on the Japanese trawler, Kitakami Maru, which recently fished in the U.S. Fishery Conservation Zone over the Hancock Seamounts near Midway.

20 - Dr. Jed Hirota, University of Hawaii, spoke on "Relationships among circulation, hydrography, and productivity at French Frigate Shoals, NWHI."

La Jolla Laboratory

November 3 - David J. Mackett, Southwest Fisheries Center, presented a talk on "Planning and control of research and development programs."

November 17 - Dr. Erlend Moksness, Marine Research Station, Flødevigen, Norway, spoke on "The use of basins to investigate fish larval ecology at the Marine Research Station, Flødevigen, Norway."

24 - Dr. Stewart Willason, University of California at Santa Barbara, presented a seminar on "Laminarinase and zooplankton: Diel variation and mesoscale pattern."

Tiburon Laboratory

November 13 - Two speakers presented talks at a seminar cooperatively sponsored by the Tiburon Laboratory, Tiburon

Center for Environmental Studies, and San Francisco State University. Dr. George Barlow, University of California at Berkeley, spoke on "Patterns of parental investment, dispersal and size among coral-reef fishes," and Dr. Louis W. Botsford, University of California at Davis, talked about "Cycles in northern California dungeness crab populations."

18 - Dr. Richard Wilhemson, Chief of Staff of Environmental Studies, Bureau of Land Management, Los Angeles, spoke on the "Status of BLM's Pacific outer continental shelf environmental studies," at a seminar cooperatively sponsored by the Tiburon Laboratory, Tiburon Center for Environmental Studies, and San Fransisco State University.

TRAINING

Honolulu Laboratory

November 4-6 - Reginald Gooding, Fishery Biologist - "Minicomputers-Configurations and Application," Honolulu, Hawaii.

La Jolla Laboratory

September 21-November 16 - John Gregory, Biological Technician - "Data Structures", La Jolla, California.

November 10-13 - Dan Gittings, Librarian - 7th Annual Conference of the International Association of Marine Science Librarians; La Jolla, California.

November 11-12 - David Mackett, Planning Officer, Roy Allen, Scientific Illustrator, and Ken Raymond, Scientific Illustrator - all attended "Visual Communication Congress Seminar," Los Angeles, California.

Tiburon Laboratory

November 16-19 - Maureen Woods, Librarian - "1981 Federal Interagency Field Librarians' Workshop," Seattle, Washington.

VISITORS

Honolulu Laboratory

November 18 - Robert Stone, a fishery consultant from Fiji, and Elliot Rosenberg, Executive Director, Economic Development Authority, Ponape, visited Laboratory Director Richard Shomura.

20 - Sam Pooley, Western Pacific Regional Fishery Management Council, visited Richard Shomura.

23 - Barbara Sunderland of Hawaiian Opinion, Inc. met with Laboratory Director Richard Shomura, Dr. Robert Skillman, and James Cooper to discuss the contract on a cost-earnings study of the Hawaiian handline and longline fisheries, which was recently awarded to Hawaiian Opinion, Inc.

- Robert E. K. D. Lee, UNDP, Bangkok, Thailand, visited Richard Shomura.

25 - Dr. Karl Samples of the University of Hawaii discussed fishery economics with Richard Shomura, Dr. Robert Skillman, David Hamm, and James Cooper.

- SWFC Planning Officer David J. Mackett arrived in Hawaii to attend the Western Pacific Regional Fishery Management Council meeting on Molokai, November 30-December 2.

La Jolla Laboratory

October 13-November 13 - Leonardo Mariduena, Government of Ecuador, came to the Center to meet and work with members of the SWFC Coastal Fisheries Resources Division.

November 2 - A group of 46 businessmen from the Japanese fishing industry visited the Center. Deputy Director John Carr held an informal question-and-answer session with the group's members.

3 - John Sunada, California Department of Fish and Game Biologist stationed at Long Beach, California, visited Alec MacCall to discuss methods of population analysis of ridgeback prawns.

November 10 - Brian Edwards, economics graduate student at University of California, San Diego, came to the Center to discuss potential cooperative research regarding economics and fisheries management with Dr. Dan Huppert.

12-13 - Dr. Sam Bledsoe, Northwest and Alaska Fisheries Center, came to the Center to work on the albacore model with Al Coan and Earl Weber.

16 - Charles Miller, EUROSAT, Geneva, Switzerland.

18 - Katsuo Saito, Hokkaido Central Fisheries Experimental Station, Hokkaido, Japan.

20 - Kent Hushion, R/V David Starr Jordan, La Jolla, California.

Tiburon Laboratory

November 12 - F. Cotton, John Jurich, and T. Killala, U.S. Department of Commerce, San Francisco, California.

17 - Deke Melson, University of California Bodega Marine Laboratory, Bodega Bay, California.

24 - Bob Merrill, Bay Conservation and Development Commission, visited the Laboratory to discuss striped bass research and pollution research with Dr. Jeanette Whipple and Dr. Robert MacFarlane.

25 - Maryann McEnroe, University of California, Davis, California.

MEETINGS AND TRAVEL

Honolulu Laboratory

November 9-10, 12 - Honolulu Laboratory personnel met with Western Pacific Regional Fishery Management Council staff at the Laboratory.

13 - Laboratory Director Richard Shomura attended a Sea Grant meeting at the University of Hawaii, Honolulu.

18 - James Uchiyama attended the monthly meeting of the Marine Affairs Forum. Guest speaker Dr. Craig MacDonald spoke on his spiny lobster project at Kure.

24 - Richard Shomura participated in a meeting of the Hawaii Fisheries Coordinating Council.

27 - Richard Shomura participated in a meeting of the Western Pacific Regional Fishery Management Council's Spiny Lobster Advisory Panel at the Hawaii State Capitol.

30 - Honolulu Laboratory senior staff members provided an overview of research activities for Southwest Region Director Alan W. Ford.

- Richard Shomura and William Gilmartin departed for Molokai to attend the Western Pacific Regional Fishery Management Council meeting.

La Jolla Laboratory

October 31-November 5 - Dr. Reuben Lasker attended the Ocean Color Instrument (OCI) meeting at the Brookhaven National Laboratory, Upton, New York.

October 31-November 12 - Center Director Dr. Izadore Barrett and Drs. Norm Bartoo and Sam Herrick traveled to the Canary Islands to attend the Standing Committee on Research and Statistics (SCRS) and the Seventh Regular Meeting of the International Commission for the Conservation of Atlantic Tunas (ICCAT).

October 31-November 18 - Dr. Gary Sakagawa traveled to the Canary Islands to attend the ICCAT's SCRS meetings and to serve as Tropical Tuna Rapporteur and Skipjack Committee Chairman.

November 1-6 - Dr. R. Michael Laurs traveled to Lake Arrowhead, California, to participate in NOAA SEASAT/NIMBUS satellite final report.

9 - An EEO meeting was held at the Center.

9-13 - Dr. Reuben Lasker traveled to Juneau, Alaska, to attend the PROBES Annual Workshop meeting.

November 10-12 - Dr. Daniel Huppert traveled to Portland, Oregon, to attend Pacific Fishery Management Council and Scientific and Statistical Committee meetings.

11-12 - Roy Allen, Dave Mackett, and Ken Raymond traveled to Los Angeles, California, to attend training seminars in audio-visual graphics and presentations.

16-18 - John Carr, Deputy Director, traveled to Miami, Florida, to attend a NMFS Vessel Committee meeting.

16-20 - Dave Mackett traveled to Gleneden Beach, Oregon, to attend the Western Groundfish Conference and visit the Oregon Department of Fish & Wildlife, Pacific Fishery Management Council, and Pacific Marine Fisheries Commission.

17-20 - Dr. Izadore Barrett, Center Director, traveled to Gleneden Beach, Oregon, to attend the Western Groundfish Conference.

18 - Fred Kellenberger traveled to Terminal Island, California, to attend a statistics meeting with personnel from California Fish & Game.

19-20 - Dr. John Hunter traveled to Ensenada, Mexico, to give lectures to students in the Department of Oceanography at the graduate school, C.I.C.E.S.E.

21-23 - Dr. R. Michael Laurs traveled to Reno, Nevada, to make presentations at American Fisheries Research Foundation and Western Fishboat Owners Association meetings.

23 - Dr. Norman Bartoo attended a meeting of the American Fisheries Research Foundation, in Reno, Nevada.

23-24 - Fred Kellenberger traveled to Sacramento, California, to attend a FIN meeting.

25 - Dr. Izadore Barrett, Center Director, traveled to Terminal Island, California, to meet with Southwest Regional Director Alan Ford.

30 - Dr. Izadore Barrett attended an IMR Advisory Council meeting at Scripps Institution of Oceanography, La Jolla, California.

Tiburon Laboratory

November 3 - Ed Ueber traveled to Santa Cruz, California, to chair and participate in a meeting concerning the sablefish fishery of Monterey Bay.

3-5 - Drs. Jeanette Whipple and Bruce MacFarlane traveled to Boulder, Colorado, to attend the OMPA meeting to review FY 81 intra-NOAA research funded by L-RERP.

4-6 - Lt. Patrick Rutten traveled to Eureka and Ft. Bragg, California to participate in an Alternative Fisheries Workshop.

10-12 - Laboratory Director, Norman Abramson traveled to Portland, Oregon, to attend the SSC and Pacific Fishery Management Council meetings.

10-16 - Ed Ueber met with Chris DeWees, U.C. Sea Grant, to introduce DeWees to the fish processors along San Francisco water front.

11-13 - Sus Kato and Lt. Patrick Rutten were aboard the F/V Oregon Beaver to conduct fishing for shortbelly rockfish.

16-17 - Ed Ueber met with fish processors in Ft. Bragg, Eureka, and Crescent city, California.

16-19 - Maureen Woods traveled to Seattle, Washington, to attend the Federal Interagency Field Librarian Workshop.

17-20 - Peter Adams, Norman Abramson, Candice Cooperrider, Tina Echeverria, Sus Kato, Ed Ueber, Bill Lenarz, and Ted Hobson traveled to Gleneden Beach, Oregon, to participate in the Western Groundfish Conference.

PERSONNEL ACTIONS

Honolulu Laboratory

November 2 - William B. Barnett, Biological Technician (Fisheries) - Conversion to Full-time, Temporary Appointment.

10 - Michael P. Seki, Biological Technician (Fisheries) - Conversion to Full-time, Temporary Appointment.

15 - Bert S. Kikkawa, Biological Technician (Fisheries) - Return to duty.

29 - Ronald C. Antinoja, Computer Assistant - Part-time, Temporary Appointment.

- Walter N. Ikehara, Biological Technician (Fisheries) - Full-time, Temporary Appointment.

La Jolla Laboratory

November 9 - Robert Franco, Biological Technician - Promotion.

10 - Mike Gregory, Biological Technician - Separation-Transfer.

14 - Tom Gronholt, Biological Technician - Separation-Transfer.

- Ray Stives, Biological Technician - Separation-Transfer.

21 - Tom Shay, Biological Technician - Separation-Transfer.

23 - Virginia Rivers, Biological Aid - Temporary Appointment, NTE 11/22/82.

29 - Gabriele Lichlyter, Clerk-Typist - Temporary Appointment, NTE 11/28/82.

- Ken Wallace, Computer Programmer - Promotion.

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